Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands	)	WT Docket No. 02-146
	)	
Loea Communications Corporation Petition for Rulemaking	)	RM-10288
	)	

COMMENTS OF COMSEARCH

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SUMMARY

Comsearch, an independent engineering firm specializing in spectrum management of fixed point-to-point and point-to-multipoint terrestrial microwave, satellite and mobile telecommunications systems, supports the Commission's efforts in this proceeding to establish effective rules to make the 71-76, 81-86, and 92-95 GHz bands available for commercial use.

We strongly support the Commission's tentative conclusion to regulate this spectrum under Part 101. Site-by-site licensing under Part 101 has significant advantages over geographic area licensing for these bands. Frequency coordination under Part 101 is a working system to avoid mutual exclusivity in license applications, and we do not believe that it would be in the public interest to reject this system in favor of geographic area licensing. As an alternative to site-by-site licensing, unlicensed usage is possible in these bands but would require interference protection and frequency registration or coordination as suggested in the Spectrum Policy Task Force Report.

Speed of system implementation is a key concern for development of these bands. We believe that improvements such as web-based software and electronic communications will make it possible to complete the Part 101 frequency coordination process for these bands more quickly than in the past. Electronic batch filing of license applications into the FCC's ULS will further improve the process.

However a major concern potentially impacting implementation speed is the necessity of coordinating with the Federal Government in shared bands. Conditional Authorization is not available when Government coordination is required, and applications can be held up for months and sometimes years in the archaic FCC/IRAC coordination process. We support the Commission's ongoing efforts to streamline this process and appreciate all efforts to negotiate improvements with NTIA. We recommend that the process could be improved by making NTIA a party to the commercial Part 101 coordination process or by creating a "trusted coordinator" entity with access to classified Government system data to accomplish the necessary coordination in the pre-application stage of system design. A quick, effective system of coordination between Federal Government and commercial users is vital for development of these bands.

We fully support protection of the Radio Astronomy Service (RAS) observatories and recommend that either the observatories could develop a coordination web site, or, if they do not wish to take on this responsibility, that the Part 101 frequency coordinators could be made responsible for the necessary interference calculations. We suggest that protection of Government FSS earth terminals from commercial FS interference in the 74-76 GHz band can be accomplished by establishing coordination or exclusion zones around the Government installations where these terminals might be located.

We believe that the interference criteria of §101.105 are applicable to these bands and do not require any modification. We recommend a higher standard for coordinate accuracy in these bands than is currently included in Part 101 and Part 1, and also recommend relaxing the antenna standards proposed by Loea to allow for the use of 1-foot diameter antennas.

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Comments of Comsearch

I. INTRODUCTION

Comsearch, pursuant to §1.415 of the FCC rules, hereby respectfully submits the following comments in response to the Notice of Proposed Rulemaking ("NPRM") in the above captioned proceeding.

Comsearch is an independent engineering firm specializing in spectrum management of fixed point-to-point and point-to-multipoint terrestrial microwave, satellite and mobile telecommunications systems. Comsearch has spent the past 25 years working with the FCC and actively participating in various leading industry groups to develop rules, industry recommendations, and standards to promote efficient use of the radio spectrum. Our direct experience in the spectrum management process which includes expertise in system design and radio frequency engineering, coordination,

regulatory support, database management, and software development makes us qualified to comment in this proceeding.

II. OPERATIONAL RULES

A. Comsearch Supports Regulating the Bands Under Part 101

We agree with the Commission's tentative conclusion that regulating the bands under Part 101 of the Rules is the most appropriate.[1] Because the types of services being contemplated for these bands are predominantly fixed microwave services, Part 101 is the natural choice for these bands. The spectrum currently regulated under Part 101 supports a variety of uses, technologies, and users. Included in this list are Long Haul operators with contiguous microwave networks traversing thousands of miles; Cellular, PCS and Local Access operators connecting cell sites and customer premises; Utilities, Petroleum, and Railroads providing communication and control; and State and Local governments and Public Safety entities providing vital life-saving communications. As evidenced by the number of different users and uses, the regulatory regime of Part 101, including the requirement for frequency coordination found in §101.103(d), provides for an extremely effective spectrum management process that promotes efficient use of the spectrum. This same regime can be just as effective for the 70 – 100 GHz bands with some proper adjustment of the technical and service rules.

[1] NPRM at ¶ 93.

B. Site-by-Site vs. Geographic Licensing

In the NPRM, the Commission proposes operational rules for the bands including the use of geographic area licensing and requests comment on this approach as well other alternative licensing schemes including site-by-site licensing or unlicensed use.[2] We agree with Loea that site-by-site licensing would be the most efficient licensing regime for the bands. Licensing fixed point-to-point systems on a geographic basis is a highly inefficient use of the spectrum and not in the public interest. The Commission cites several benefits of geographic licensing including the flexibility to adjust spectrum usage based upon market demands, the ability to maximize the use of spectrum in areas of highest demand, and the ability to coordinate usage across a broad geographic area. These benefits are most applicable to licensees employing a mobile or area type of operation whereas the systems envisioned for these bands are fixed point-to-point. With a low likelihood of interference as a result of the high gain/narrow beamwidth antennas that will be used, site-by-site licensing will provide a high degree of flexibility without the need to tie up spectrum over a large geographic area or bid at an auction.

We believe that the best way to achieve the Commission's stated responsibility of promoting the provision of communication services to all Americans, encouraging diverse ownership via a variety of platforms, and allowing licensees to make the most efficient use of their assigned spectrum is through the use of site-by-site licensing. Site-by-site licensing, as opposed to geographic licensing, makes significant diversity of

[2] NPRM at ¶¶ 65-73.

ownership possible.[3] In the existing Part 101 point-to-point bands licensed on a site-by-site basis, literally thousands of various licensees have deployed hundreds of thousands of transmitters across the country.[4] The significant number of licensees and high level of frequency use found in these bands is testament to the diversity of ownership and spectrum efficiency gained through the Part 101 coordination and licensing process. Providing unfettered access to spectrum for all Americans and using it in an efficient way is in the public interest.

The Commission states that a site-by-site licensing scheme could impose administrative burdens on the Commission as well as applicants for the spectrum, impose substantial expenses on licensees, and reduce the flexibility required to respond rapidly to changing market conditions.[5] In addition, the Commission refers to the "substantial and costly burdens that site-by-site licensing imposes on potential licensees."[6] We acknowledge that some administrative effort is required by the Commission and applicant under a site-by-site licensing regime, but disagree that the effort required rises to the level of a hardship. Over the last several years, great strides have been made at the Commission and within the industry to substantially improve the site-by-site application and licensing process. As correctly pointed out in the NPRM, the FCC's introduction of the Universal Licensing System (ULS) allows for electronic filing of applications and has

[3] Geographic area licensing is a barrier to diverse ownership because of the significant cost associated with participating in and winning licenses through auction and the limited number of licenses that are available.
[4] See NTIA Report 00-378, "Spectrum Usage for the Fixed Services". The Report showed 126,000 Common Carrier and Private Operational Fixed microwave licenses (1997 data).
[5] NPRM at ¶ 68.
[6] NPRM at ¶ 69.

streamlined the application process significantly.[7] At the same time the industry working in cooperation with the Commission has invested significant time and capital into the development and implementation of a batch filing capability to further reduce the time and effort required to process a site-by-site application. Unlike the interactive filing method found on the FCC's ULS web site, that requires each application to be filled out and submitted individually, the batch filing software dumps application data directly from frequency coordinator databases into the ULS database for processing. This software has no limit on the number of applications that can be simultaneously filed. These industry systems along with the Commission's ongoing ULS development efforts have significantly reduced the time and effort required to process applications. Further refinements are anticipated that will make the site-by-site application process virtually "push button" friendly and almost insignificant to the applicant and the Commission staff. At the same time the administrative burdens of geographic licensing, including the auction process, should not be underestimated. The amount of time and effort required by the Commission and potential licensee to develop, conduct, and participate in a typical auction, and including the subsequent reporting requirements proposed for geographic licensees in the NPRM, are significant.

We also disagree with the Commission's assertion that the site-by-site licensing process imposes cost burdens on potential licensees or necessarily reduces a licensee's flexibility. The costs to prepare an application and the subsequent FCC filing and regulatory fees are negligible when compared with the overall costs of system

[7] NPRM at ¶ 118.

implementation and when compared to the historical costs associated with purchasing spectrum through auction.[8] Besides being far less costly than auction fees, site-by-site licensing fees also provide the potential licensee with other significant benefits. Where auctions require the bidder and potential licensee to pay substantial monies up-front based upon an estimate of future demand, site-by-site fees are scaleable based upon the number of deployments and are therefore much easier to budget, manage, and develop a sound business plan around.

Finally we believe that a high degree of flexibility can be attained in a site-by-site licensing structure. The licensing process itself, whether on an individual site-by-site or area-wide geographic basis, does not necessarily dictate the amount of flexibility given to the licensee. Rules can be promulgated under either licensing regime defining the amount of flexibility afforded to the licensee. Service and technical rules can be written to provide the industry with a general framework within which to operate but also allow for a significant amount of self-regulation. For instance, in §101.105, the Commission specified the use of TIA TSB10 or other procedures that follow good engineering practices for interference standards. By depending upon the industry for the development of recommendations and standards the Commission can maximize flexibility of the rules.

[8] Licenses obtained on a site-by-site basis are relatively inexpensive with the current FCC application and regulatory fees for new point-to-point microwave systems being $320/transmitter or $32/year/transmitter over a typical ten-year license term.

C. Site-by-Site Licensing vs. Unlicensed Usage

Site-by-site licensing is also preferable to unlicensed use in the bands. The systems contemplated for these bands are high bandwidth and will be expected to meet high availability standards. Thus, we believe the devices will be carrier-class rather than consumer class. One of the key components in effectuating an acceptable business plan and promoting capital investment in this environment is the necessity for a certain guarantee of operational stability. Unlicensed devices have no interference protection and therefore no "guarantee" of operational stability. Unlicensed systems that are deployed today are at continual risk of being severely degraded or inoperable in the future due to unwanted interference.

If the Commission opts to allocate some portion of these bands for unlicensed use, other than for low power indoor devices, some form of device registration or frequency coordination should be required. This registration/coordination process should be industry controlled to minimize the burdens on the Commission. To be effective it should be a web-based automated procedure that includes some form of interference analysis to predict potential conflicts. The analysis would be run against data within the database and systems meeting the interference criteria would be approved on a first-in-time basis. This would provide some level of interference protection currently missing from existing unlicensed bands and is consistent with the recommendations of the FCC's Spectrum Policy Task Force.[9]

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[9] See Spectrum Policy Task Force Report at p. 54. "For new unlicensed bands, access should be controlled by a new type of band manager or frequency coordinator selected by the FCC."

D. Comsearch Opposes Auctioning Microwave Spectrum

The Commission has an obligation to "use engineering solutions, negotiation, threshold qualifications, service regulations, or other means to avoid mutual exclusivity where it is in the public interest to do so."[10] With an effective Part 101 coordination process available to avoid mutual exclusivity, we do not believe that licensing these bands by auctioning geographic area licenses is in the public interest. The microwave service rules of Part 101 are designed to avoid mutual exclusivity among applications. Rules such as transmitter power limitations, directional antenna requirements, interference protection criteria, and frequency coordination procedures, among others, are intended to prevent users from causing interference to each other and therefore to avoid mutual exclusivity. These procedures are effective and mutually exclusive situations rarely, if ever, occur. Under site-by-site licensing the interference analysis that is required under §101.103(d) is performed by those in the coordination industry rather than by the Commission staff. The small number of conflicts that do occur are almost always resolved prior to application filing. Among the many options coordinators have at their disposal to resolve conflicts are antenna upgrades, frequency changes, or use of automatic transmitter power control (ATPC). Users solve interference problems among themselves and thereby minimize the involvement of the FCC staff. On the other hand, under geographic licensing, mutually exclusive situations are obvious. A conflict exists when two applications are received for the same spectrum in the same service area. The Commission should not ignore the Part 101 process, a working system of "engineering

[10] NPRM at ¶107.

solutions" to avoid mutual exclusivity, and impose geographic area licensing in these bands.

E. Band Managers

As stated previously, we do not believe that licensing the 71-76, 81-86, and 92-95 GHz bands by geographic area would be the most effective way to administer this spectrum. We agree with Loea that site-by-site licensing is preferable to geographic licensing and band managers. We also find unlicensed usage with registration or coordination preferable to geographic licensing.

We believe that a primary use of this spectrum would be for extremely high bandwidth "fiber-like" interconnections of private networks. For effective deployment, spectrum needs to be available to a large number of users. If the Commission disagrees with us and the majority of commenters to Loea's rulemaking petition who favor site-by-site licensing, and selects a geographic area licensing scheme, then we believe it must include band managers among the eligible licensees in order to ensure the availability of spectrum to multiple users. In our view the band manager would, however, be an unnecessary middleman in the process since the spectrum could easily be licensed directly to the users under site-by-site licensing.

III. FREQUENCY COORDINATION

A. Improvements to the Part 101 Coordination Process

The Part 101 prior coordination process, established by the Commission in the early 1970s and subsequently refined and streamlined by the industry over the ensuing decades, has proven to be a highly efficient and effective means to assign frequencies and avoid mutual exclusivity between applicants in the fixed microwave bands. Together with the recent improvements to the application and licensing process made by the Commission, namely the ability for conditional authorization and electronic filing through the ULS, the entire process of coordination, application, and licensing has been improved significantly.

Under the current frequency coordination process outlined in §101.103(d), individual microwave links are studied for interference, prior coordinated with affected users, and then applied for with the Commission. The standard process generally takes about 45 days. Under conditional authorization procedures currently found in Part 101, transmitters are allowed to go into service after successful completion of coordination and upon application submittal. Because applications can be completed and filed almost simultaneously with the completion of coordination, operation can commence immediately thereafter. The coordination process is very efficient in accommodating multiple uses, maximizing spectrum utilization, dealing with shared spectrum scenarios, avoiding interference and mutual exclusivity, and minimizing Commission involvement.

We believe that the existing Part 101 coordination process provides the most effective means to manage the spectrum in the 70–100 GHz bands. Through industry and FCC improvements to the process, such as software automation, flexible rules, and coordination agreements between affected parties, the current process can be further streamlined to meet the need for quick deployment sought by most proponents of the bands. In §101.103, the Commission sets forth a standard 30-day coordination period but also allows for coordinations to be expedited. In the 38 GHz band, the Commission responded to industry "speed to market" issues and adopted special coordination provisions that included a shorter 10-day coordination period. Web based software is available or is being developed that will support electronic data entry, conduct interference analyses, notify affected licensees, produce the FCC application, and file the application with the Commission. It is anticipated that the entire process could be completed in a matter of days rather than weeks. Assuming that a licensing procedure can be developed that will include conditional authorization, it is conceivable that a system could be deployed in as little as 3-5 days from the date of equipment sale.

Regardless of the coordination period ultimately adopted, we would view that period to be the "worst case" time frame with the rules giving the industry the flexibility to derive procedures that may be substantially quicker. The Commission has a history of allowing and encouraging private agreements between affected parties to facilitate the coordination process. These agreements made between licensees regarding "interference protection rights" and information transfer can further work to facilitate the coordination process.

B. Commercial and Government Band Sharing

In paragraph 47, the Commission notes that all of the bands are shared on a co-primary basis between Federal and non-Federal Government services and that the rules "must provide for equitable sharing". In paragraph 48, the Commission proposes to include specific areas identified by NTIA which will require coordination with the Frequency Assignment Subcommittee (FAS), and seeks comment on this proposal and other ways to limit the administrative burdens for the Commission, NTIA, and potential licensees while still requiring Interdepartmental Radio Advisory Council (IRAC) coordination.

Commercial applications for shared spectrum that are filed with the Commission go through a labyrinth of reviews, data manipulations, and approvals that can delay license grant in these bands for up to six months or more. In many cases, these delays have caused companies to abandon the use of shared bands such as 23 GHz in favor of non-shared or quasi-shared bands that allow for a quicker time to market.[11] To date, relief from this arduous process has been primarily through the use of geographic or frequency separation.

In bands shared between commercial and government systems, the terms equitable and co-primary do not equate to co-equal access to the spectrum. While government system applications are approved through the IRAC coordination process,

they are not subject to commercial industry review.[12] Commercial systems, on the other hand, go through a detailed interference and coordination process, but gain access to the spectrum only after detailed review and approval through the same IRAC coordination process. Commercial applications can be held up or "tabled" for months and sometimes years in this process. This problem occurs in large part because the commercial sector does not have access to Government data in the initial planning stages. Under these conditions, system designs are done virtually in the dark in shared bands. If problems are later identified after FCC application and subsequent IRAC review, final resolution of the problem can require a seemingly never ending and inefficient process of trial and error until the problem is resolved. In some instances, little explanation is given for the "tabling" of the application, and the commercial applicant is left with the impractical task of trying to design around something that is for all intents and purposes, invisible. On the other hand, proposed Government systems processed through the NTIA and then forwarded to the FCC receive no detailed interference review by the Commission or the commercial sector and appear to be routinely accepted. This one-sided review process is highly inefficient, does not adequately address potential interference concerns for all parties, and unfairly places the commercial sector at a significant disadvantage to gaining access to spectrum in shared bands.

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[11] For example applications in the 18 GHz band, except for certain restricted areas, have the advantage of conditional authorization that allows applicants to implement service upon application submittal.

[12] The FCC holds a seat on the IRAC representing the commercial sector and receives notice of all government actions; however, it is our understanding that the FCC does not routinely conduct detailed interference analysis of these applications against commercial systems prior to granting approval.

The current commercial/Government coordination process involves multiple unnecessary steps leading to excessive delays in system licensing and deployment. A commercial application is processed at least seven times before a license is granted. Following is a summary of the process including a typical timeline:

1. Day 1: A commercial application is submitted electronically through the FCC's ULS.

2. Day 2 – 14: The FCC's Gettysburg office processes the data and identifies applications that fall within shared bands. After a one to two week period, these applications are then forwarded to the FCC's Office of Engineering Technology (OET).

3. Day 15 – 30: OET personnel process the data to be compatible with the NTIA's software. This processing and delivery to the NTIA takes approximately 2 - 3 weeks.

4. Day 31 – 35: The NTIA Frequency Assignment group then processes the data. If data errors are identified, the information is sent back to the OET to resolve. If the data is acceptable, a computer cull is run to identify potentially affected government systems. This information is then forwarded to IRAC member organizations for review.

5. Day 36 – 57: The data is processed again by each member organization for interference potential with each of their respective systems. Each member organization is given 15 business days to respond denoting a clearance or a conflict.

6. Day 58 – 60: The IRAC member organizations' response goes back to the NTIA, who in turn notifies the OET. If a conflict or problem has been identified, the application is considered "tabled".

7. If the application is cleared, the OET notifies the Gettysburg office and a license grant is issued. If the application is tabled, clearance is subject to effective interaction between the OET and NTIA. This interaction can take months and in some cases over a year to resolve. The licensee is never notified that a problem exists nor given guidance regarding corrective measures to gain clearance.

As an extreme example of the shortcomings of the existing process, we wish to highlight the glacial progress to licensing of FCC File Number 0000416304, a Part 101 application in the shared 900 MHz point-to-point band. The following sequence is copied from the ULS history record of this application:

New Application Received	04/03/01
Offlined for Engineering Review	04/05/01
IRAC Screening Completed	04/05/01
Coser Screening Completed	04/05/01
Accepted for Filing PN Generated	04/11/01
Sent to IRAC	06/21/01
IRAC Screening Completed	06/21/01
Clearance returned from IRAC with objection	04/16/02
Received from IRAC	04/16/02
Application Returned	05/30/02
Return Letter Sent	05/31/02
Amendment Received	07/12/02
IRAC Screening Completed	07/13/02
Coser Screening Completed	07/13/02
Sent to IRAC	07/16/02
Application Granted	10/30/02
Received from IRAC	10/30/02
Authorization Printed	10/31/02
Action PN Generated	11/06/02

In particular it appears that this application was tabled or somehow otherwise lost in the process for nearly a year between June 21, 2001, and April 16, 2002. The amendment application filed on July 12, 2002 restated the original application with no changes, because the Federal agency simply withdrew its objection. Even ignoring the seemingly endless administrative delays involved in passing the application back and forth between the FCC and IRAC, a direct and immediate interaction between the

applicant, commercial frequency coordinator, and Federal agency could have prevented the application from being held up for nearly a year with no action. Even in cases where there actually is a likelihood of interference, commercial applicants need to know that right away so that they can modify the parameters of their application or make alternate plans.

We are encouraged by the Commission's ongoing efforts to look for ways to streamline the commercial/Government coordination process. The 70 – 100 GHz bands provide the perfect opportunity to implement a new approach that does not rely on outdated procedures, but takes advantage of today's efficient electronic and information technology. As one option, we propose that the NTIA, through the workings of the FAS, become party to the commercial frequency coordination process described in §101.103. Under this arrangement, commercial entities proposing new systems would forward their proposals to the NTIA and get clearance prior to application submittal with the FCC. This involvement and pre-clearance by the NTIA in the design proposal stage would remove the uncertainties inherent in the existing system and allow for the provision of conditional license authorization that is available in other frequency bands.[13]

As a second option, we propose that a commercial entity with security clearance be given access to the Government data in these bands. In consultation with NTIA, this

[13] See 47 C.F.R. 101.31(b). Conditional authorization allows an applicant to operate stations immediately upon completion of frequency coordination and application filing. Significantly, conditional authorization is not available if government coordination through IRAC is required. This limitation could be removed if the coordination process prior to application filing protected federal government users as well as commercial users.

entity would develop software and procedures to analyze commercial proposals against the Government database in order to protect Government facilities from interference. Once NTIA could certify the accuracy of the results, it would no longer be necessary to go through a lengthy post-application review process. This entire process can be highly automated to reduce the burdens of review, analysis, and clearance but will require a significant change in the current NTIA/IRAC spectrum management process.

C. Coordination with RAS

In the NPRM the Commission has identified 18 areas where coordination will be required with RAS observatories. We agree that in many cases interference concerns may be resolved by taking into account the directionality of the fixed service antennas and loss due to terrain shielding between the fixed service transmitter and RAS antenna. Further, while we presume that the coordination radii requested by NSF were calculated based upon maximum allowable FS EIRP levels (~85 dBm), we expect that the present limitations on economically producing high power amplifiers for 70-100 GHz will make typical EIRP levels at least 20 dB lower. Lower EIRP levels may be another key factor in resolving interference into RAS observatories.

One way of facilitating coordination with RAS would be for the RAS observatories to maintain a web site capable of performing the interference calculations as suggested in the NPRM. To be truly effective, such a web site would have to take into account the most accurate terrain data available in calculating loss over the path of interference, and would have to use antenna discrimination values based upon the

manufacturers' published pattern data. Should the observatories find taking on this responsibility to be unduly burdensome, we believe that frequency coordinators, such as those already doing the proposed Part 101 coordination among fixed links, could also perform the necessary calculations taking into account power levels, antenna patterns, and terrain shielding. The calculation methodology used could be developed jointly by the coordinators and the RAS to ensure accuracy and acceptance of results. For FS transmitters inside the 18 coordination zones, coordination data could be forwarded to the observatories showing clearance of the interference objectives.

Whether the interference calculations are performed by a RAS web site or by frequency coordinators, the interference criteria necessary to protect the observatories must by published.[14] We presume that the criteria would take the form of a maximum allowable field strength or power flux density at the observatory coordinates. With this information, fixed service users or frequency coordinators would have the information necessary to either do the interference calculations or verify the results of calculations performed by the RAS web page.

The NPRM proposes authorizing unlicensed devices under Part 15 in primary RAS spectrum, and we question whether the RAS can be adequately protected from interference caused by unlicensed devices. Since little interaction with the FCC is required of users of unlicensed devices, we expect that these users will not have much

[14] NPRM at ¶ 43. NSF has proposed coordination radii for the RAS observatories. The FCC should publish NSF's request if it contains sufficient detail on the interference criteria and assumptions necessary to assess the interference, or otherwise should obtain this information from NSF and publish it.

familiarity with the FCC rules on RAS coordination zones. In some cases, Part 15 devices may be marketed directly to consumers. Thus it appears doubtful that coordination zones based upon geographic coordinates would be respected. We believe that it may be necessary to implement a professional installation requirement in any bands authorized for unlicensed use and shared with RAS. The installer would be responsible for verifying that the FS transmitter location was not in an RAS coordination zone or, if it was, for performing the necessary calculations to show non-interference. Alternatively, the devices could be controlled by GPS so that the transmitters would not operate if within a certain radius of an observatory.

D. Sharing between the FS and Government FSS in the 74-76 GHz Band

The NPRM proposes adding a US footnote to Part 2 stating that "In the band 74-76 GHz, stations in the fixed, mobile, and broadcasting services shall not cause harmful interference to stations of the Federal Government fixed-satellite service." We presume that Federal Government earth terminals would be located at a limited number of Federal installations, and that protection of these terminals could be accomplished by implementing coordination zones or exclusion zones at these locations. Elsewhere in the NPRM, the Commission proposes "to include in the final rules specific areas proposed by NTIA during this proceeding which will require coordination with the Frequency Assignment Subcommittee (FAS) of the Interdepartmental Radio Advisory Committee (IRAC)…"[15] The Commission should request that NTIA include in this list of areas those that are necessary to protect the Federal Government fixed-satellite service earth

[15] NPRM at ¶48.

terminals. This approach would accomplish protection of the Government FSS while allowing development of the fixed service.

IV. TECHNICAL RULES

A. Interference Criteria for Site-by-Site Licensing

In coordinating point-to-point microwave links under Part 101, interference objectives are determined using the threshold to interference (T/I) approach discussed in Annex B of TIA TSB 10-F. The T/I approach tries to limit degradation of the receiver threshold to less than 1 dB by limiting interference to 6 dB below the receiver thermal noise power level. In bands where multipath fading dominates path performance, the T/I approach preserves the full path fade margin with the expectation that fading of the desired signal and interfering signal(s) will not be correlated. In contrast, in bands such as 70-100 GHz where the path performance is dominated by rain, fading of the desired signal and interfering signal(s) may be highly correlated, depending on the relative geometry of the links. If an interfering signal would fade along with the desired signal, then it would be appropriate to use an interference objective much less stringent than the TSB10-F T/I requirement for that interference. As long as the basic C/(N+I) requirement of the digital modulation scheme (plus a safety margin) was met, the receiver would not suffer additional unavailability as a result of that interference. Therefore, while T/I represents a fail-safe system for coordinating 70-100 GHz, additional link density and spectral efficiency may be attained by relaxing the interference objectives based upon expected correlated fading.

We do not believe that any rule changes with respect to interference objectives are necessary at this time. We believe that the industry will address the issue of correlated fading and arrive at a consensus for taking it into account in Part 101 frequency coordination. This consensus may take the form of modifications to TIA TSB 10 or recommendations in another engineering document as contemplated by §101.105. Until such time as the industry determines how and under what circumstances to relax the interference objectives, the existing T/I approach may be used to coordinate a large number of links into this band. Only in the future when many links are deployed will it become critical to relax the interference objectives in order to attain the maximum possible link density. The Commission should leave it to the industry to determine the objectives to use, and the existing language in §101.105 is sufficiently flexible to allow that to happen.

B. Interference Criteria for Geographic Area Licensing

For geographic area licensing, the NRPM suggests that the Commission might require licensees of adjacent areas to coordinate their facilities "whenever the facilities have optical line-of-sight into other licensees' areas or are within the same geographic area" as is required at 24 GHz. We find the "optical line-of-sight" trigger for coordination with neighbors puzzling and do not believe that it has been effective in any case for coordination at 24 GHz. The term "optical line-of-sight" is not defined by the FCC and multiple interpretations of the phrase are possible. If it is intended that someone should visit a proposed antenna site and observe whether any portion of a neighboring service area is visible, the requirement is nonsensical because the service area boundaries

only appear on maps and not in the real world. If, instead, it is intended that line-of-sight should be determined by calculation, we suggest that "radio line-of-sight" rather than "optical line-of-sight" would be the proper requirement since this is a standard calculation for radio engineers and would take into account the parameters of the band under consideration. The calculation would have to use a terrain database and perhaps make assumptions about height of clutter above ground level, both potential sources of error and disagreement between neighbors. Another uncertainty built into the rule is what assumption is to be made about the height above ground level of the neighbor's antenna(s), the locations of which are unknown prior to coordination.

The Commission should not extend this vague and unwieldy rule to the 70-100 GHz bands. Instead, the rules should simply state that coordination with neighbors is required. The parties should then be free to make any mutual agreement they consider appropriate to eliminate the exchange of unnecessary coordination data.

C. Coordinate Accuracy

FCC §101.21(e) requires that station coordinates be specified to an accuracy of plus or minus one second of latitude and longitude. FCC §1.923(c) requires that station coordinates be specified to the nearest second. The 601 application form indicates that coordinates may be entered to the nearest tenth of a second, and ULS also records site coordinates to this accuracy. Because of the short path lengths that are likely to be used in the 70-100 GHz bands, and the highly directional antennas that are being proposed, accurate antenna site coordinates are necessary for interference analysis. Rounding site

coordinates to the nearest second could introduce a great deal of uncertainty as to the actual antenna azimuth on a path. For instance, our calculations for a 100 meter long transmission path showed that rounding the site coordinates to the nearest second could introduce error of plus or minus 22 degrees in the calculated path azimuth versus the actual path azimuth. We believe that it is practical to specify antenna site coordinates to the nearest tenth of a second by carefully using GPS techniques, and that doing so will greatly improve analysis accuracy. The GPS Wide Area Augmentation System (WAAS) is now in service and GPS manufacturer Magellan reports "WAAS is accurate to within three meters or less. System upgrades are being developed which will soon provide accuracy to well within one meter."[16] Three-meter accuracy corresponds to approximately a tenth of a second in geographic coordinates. WAAS enabled GPS receivers are available for under $500 from several manufacturers. The Commission should modify §101.21(e) and §1.923(c) to state that for sites using frequencies above 40 GHz, coordinates should be accurately specified to the nearest tenth of a second. We believe that ULS can accommodate this rule change without any software changes. Likewise, should any other recording of site coordinates besides site-by-site licensing be used, such as a site registration procedure under Part 15, coordinates should be specified to the nearest tenth of a second.

D. Antenna Standards

We support directional antenna requirements for these bands. Use of high gain/narrow beamwidth antennas will be necessary to reliably reach the desired path

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[16] See Magellan web page: http://www.magellangps.com/en/products/aboutgps/augmentation.asp

distances. As Loea has stated, the narrow antenna beams produced by antennas in these bands will result in a low possibility of harmful interference. In cases where there *is* a possibility of interference, it will be avoided by frequency coordination.

Loea has proposed antenna standards including a gain requirement of 50 dBi and a 3 dB beamwidth of 0.6 degrees. An antenna of approximately 2 feet in diameter is needed to meet these values. We anticipate some difficulty in achieving and maintaining antenna alignment when antennas with beamwidths narrower than 0.6 degrees are used. In addition, due to limitations of mounting space, structure loading, and aesthetics, users often prefer to use smaller microwave antennas. In the Report and Order in WT Docket 00-19, the Commission enacted rules allowing the use of smaller antennas in the 10 and 23 GHz bands than had previously been allowed. While recognizing that the use of smaller antennas could result in an increased interference potential because of wider beamwidths, the Commission decided that, on balance, the benefits of smaller antennas to users outweighed the possible harm in terms of increased interference, particularly if good pattern requirements (despite the wider beamwidth) could be maintained with the smaller antennas. With a wider beamwidth, increased interference would only occur in rare instances where a potential victim station was near the antenna main beam. On the other hand, improving the discrimination versus angle pattern requirements affects interference with a large number of nearby stations if the pattern improvement involves a large range of azimuths. We believe that the same argument applies for the 70-100 GHz bands. The Commission should adopt antenna standards that allow the use of high

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(December 16, 2002).

performance 1-foot diameter antennas. We suggest that the following parameters may be appropriate: Gain = 45 dBi, Beamwidth = 1.2 degrees, Front-to-back ratio = 60 dB. The Commission should solicit information from antenna manufacturers on specific gain, beamwidth, and pattern values of antennas that they could produce.

V. CONCLUSION

Comsearch supports the Commission's efforts in this proceeding to make additional spectrum available to the public. The amount of spectrum available in these millimeter wave bands presents exciting opportunities to develop radio systems with "fiber-like" transmission rates. We urge the Commission to consider the preceding comments as it puts together the final rules.

Respectfully Submitted,

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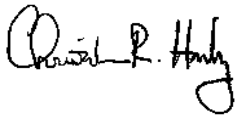

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